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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/516,327	PROCTOR ET AL.	
	Examiner	Art Unit	
	Andrew Lai	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 December 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 December 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date *See Continuation Sheet*.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :11/27/07,10/16/07,7/17/07,2/13/07,1/11/07,10/27/05,12/14/04.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: each and every reference number in fig. 2 is completely blackened out. Applicant is advised not to print the drawings' reference numbers in boxes with gray background color, which after optical scan causes a total blacken-out of the reference numbers. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claim 16 is objected to because of the following informalities: "*wherein said <u>first</u> communication device...*" on line 3 of third paragraph of claim 16. It should be changed to "*wherein said <u>second</u> communication device...*" instead. Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-4, 6, 16-21, and 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Lau et al (US 6,690,657, Lau hereinafterr).

Lau discloses "a multichannel distributed wireless repeater network" (Abstract line 1) comprising the following features:

- **With respect to Independent claims 1,16,18 and 27**

Regarding claim 1, *an apparatus* (fig. 15 as "a second repeater embodiment 140 that can function in the same manner as repeater 100 [in fig. 14]", col. 8 lines 29-30, which is also shown in figs. 4-7 as "repeater" in "network 58" of various configurations, particularly, for example, "repeater 68" in fig. 4) *for facilitating wireless communications in a network* ("This invention pertains generally to local area networks, and more particularly to methods and apparatus for implementing a distributed wireless local area network", col. 1 lines 13-15) *between a first communication device* (fig. 4, e.g. "base station 60" and associated "T/R module 62") *and a second communication device* (fig. 4, e.g. "T/R module 70"), *said network including at least two bi-directional communication frequencies* (fig. 4 depicting "CH1" and "CH2" as two channels, therein

the "two channels can be arranged to be substantially non-interfering by arranging them in separate, substantially non-overlapping ranges of frequencies", col. 4 lines 59-62) *each using a time division duplex format of data transmission* (refer to fig. 15 item 144 as "duplexer 144", col. 8 line 33), *comprising:*

a receiver (fig. 15 antenna 142 and duplexer 144) *for receiving signals on said at least two bi-directional communication frequencies simultaneously* (still refer to fig. 15 and "repeater 140 incorporates an antenna 142 coupled to a duplexer 144 that allows simultaneous transmit and receive", col. 8 lines 32-33);

a signal detector (fig. 15 "power detector 168") *operatively coupled to the receiver* (fig. 15 depicting the coupling between "power detector 168" and "duplexer 144") *for determining if a signal is present on at least one of said at least two bi-directional frequencies* (although Lau does not directly describe the functionality of "power detector 168" in fig. 15, Lau states "many of the remaining functions are repeated from fig. 14", col. 8 lines 39-40, which fig. 14 "shows a block diagram for a repeater 100", col. 7 line 45, therein shown a "power detector 132", equivalent to the "power detector 168" of repeater 140 in fig. 15, which power detector "provides an indication of received power to control circuit 130");

a frequency converter (fig. 15 items 156/162 as "frequency synthesizers 156 and 162", col. 8 lines 41-42) *for converting the signal present on one of said bi-directional frequencies to a converted signal on the other of said bi-directional frequencies* ("IF [intermediate frequency] downconversion and upconversion is provided by two frequency synthesizers 156 and 162", col. 8 lines 40-42, which in a general sense is

summarized by Lau as "When a given transmitter is transmitting, repeaters in range of that transmitter receive the signal, channel-shifting the signal, and retransmit it", col. 4 lines 19-21, noting "channel-shifting" in Lau, necessarily involves *frequency conversion* since "two channels can be arranged to be substantially non-interfering by arranging them in separate, substantially non-overlapping ranges of frequencies", col. 4 lines 59-62, and see fig. 4 depicting such "channel-shifting" by "repeater 68" receiving "CH1" from "basestation 60" and retransmitting "CH2" to e.g. "T/R module 74"); *and*

a transmitter (fig. 15 antenna 142, duplexer 144 and output amplifier 164) *for transmitting the converted signal on the other of said bi-directional frequencies* ("output amplifier 164 also has controllable output power", col. 8 lines 55-56, noting that the "output amplifier 164" couples with the frequency synthesizer 162 and mixer 160 for transmitting frequency, e.g., "CH2", after frequency "upconversion" as cited above in reference to synthesizer 162).

Regarding claim 16, *a wireless local area network* (e.g. fig. 4 "network 58" which "illustrate wireless network communications", col. 3 lines 39-40) *including at least first and second bi-directional communication frequencies* ("figs. 4 and 5 assume that two substantially non-interfering channels are available", col. 5 lines 31-32), *comprising:*

a first communication device (fig. 4 "basestation 60") *capable of transmitting and receiving data on said first and said second bi-directional communication frequencies* (fig. 4 "basestation 60" communicating with, e.g., "repeater 68", which is in a system that assumes two channels or frequencies as cited above), *wherein said first communication device transmits and receives data using time division duplex format*

(refer to fig. 15 and in view of fig. 4 and see "Repeater 140 [understanding it is just one example of "repeater 68" of fig. 4] incorporates an antenna 142 coupled to a duplexer 144 that allows simultaneous transmit and receive", col. 8 lines 32-33, noting further that since "basestation 60" communicates with "repeater 68" which has the duplex feature for simultaneous transmit and receive, the "basestation 60" will have to also communicate in *time division duplex format*) *on either of said at least first or second bi-directional communication frequencies* (fig. 4 communication "CH1" [or channel/frequency 1] between "basestation 60" and "repeater 68"),

a second communication device (fig. 4, e.g. "T/R module 74") *capable of transmitting and receiving data on said first and said second bi-directional communication frequencies* (fig. 4, e.g. "T/R module 74" communicating with, e.g., "repeater 68", which is in a system that assumes two channels or frequencies as cited above), *wherein said second communication device transmits and receives data using time division duplex format* (refer to fig. 15 and in view of fig. 4 and see "Repeater 140 [understanding it is just one example of "repeater 68" of fig. 4] incorporates an antenna 142 coupled to a duplexer 144 that allows simultaneous transmit and receive", col. 8 lines 32-33, noting further that since "T/R module 74" communicates with "repeater 68" which has the duplex feature for simultaneous transmit and receive, the "T/R module 74" will have to also communicate in *time division duplex format*) *on either of said at least first or second bi-directional communication frequencies* (fig. 4 communication "CH2" [or channel/frequency 2] between "T/R module 74" and "repeater 68"),

a repeater (fig. 4, "repeater 68") *for improving a communication link between said first and said second communication devices* (fig. 4, "basestation 60" / "T/R module 74" as the *first/second communication device*, noting that "repeater" by its natural is used *for improving communication link*), *said repeater including a receiver* (fig. 15 "antenna 142" and "duplexer 144") *capable of simultaneously receiving a signal on either of said first and said second bi-directional communication frequencies* (fig. 15 and see "Repeater 140 incorporates an antenna 142 coupled to a duplexer 144 that allows simultaneous transmit and receive", col. 8 lines 32-33), *a signal detector* (fig. 15 "power detector 168") *operatively coupled to the receiver* (fig. 15 depicting the coupling between "power detector 168" and "duplexer 144") *that determines if the signal is present on one of said at least two bi-directional frequencies* (although Lau does not directly describe the functionality of "power detector 168" in fig. 15, Lau states "many of the remaining functions are repeated from fig. 14", col. 8 lines 39-40, which fig. 14 "shows a block diagram for a repeater 100", col. 7 line 45, therein shown a "power detector 132", equivalent to the "power detector 168" of repeater 140 in fig. 15, which power detector "provides an indication of received power to control circuit 130"), *a frequency converter* (fig. 15 items 156/162 as "frequency synthesizers 156 and 162", col. 8 lines 41-42) *operatively coupled to the signal detector* (fig. 15 depicting the coupling of "power detector 168" with said "synthesizers 156/162") *for converting the signal present on the one of said bi-directional frequencies to a converted signal on the other of said bi-directional frequencies* ("IF [intermediate frequency] downconversion and upconversion is provided by two frequency synthesizers 156 and 162", col. 8 lines

40-42, which in a general sense is summarized by Lau as "When a given transmitter is transmitting, repeaters in range of that transmitter receive the signal, channel-shifting the signal, and retransmit it", col. 4 lines 19-21, noting "channel-shifting" in Lau, necessarily involves *frequency conversion* since "two channels can be arranged to be substantially non-interfering by arranging them in separate, substantially non-overlapping ranges of frequencies", col. 4 lines 59-62, and see fig. 4 depicting such "channel-shifting" by "repeater 68" receiving "CH1" from "basestation 60" and retransmitting "CH2" to e.g. "T/R module 74"); *and a transmitter* (fig. 15 antenna 142, duplexer 144 and output amplifier 164) *that transmits the converted signal on the other of said bi-directional frequencies* ("output amplifier 164 also has controllable output power", col. 8 lines 55-56, noting that the "output amplifier 164" couples with the frequency synthesizer 162 and mixer 160 for transmitting frequency, e.g., "CH2", after frequency "upconversion" as cited above in reference to synthesizer 162).

Regarding claim 18, *a repeater* (fig. 14 repeater 100, or its equivalent "repeater 68" of fig. 4) *for a network* (fig. 4 "network 58") *including at least first and second bi-directional communication frequencies* ("figs. 4 and 5 assume that two substantially non-interfering channels are available", col. 5 lines 31-32, noting that "non-interfering channels" require non-interfering frequencies), *comprising:*

a receiver (fig. 14 antenna 102 and "two bandpass filters 104 and 106", col. 7 lines 47-48) *for receiving a signal on either of said at least first and second bi-directional communication frequencies* (fig. 4 depicting "repeater 68" receiving "CH1" signal from "basestation 60") *simultaneously* (still refer to fig. 14 and "Bandpass filter 104 is

designed to pass CH1 and reject CH2", col. 7 lines 48-49, suggesting filtering *simultaneously* received CH1 and CH2 signals);

a transmitter (fig. 14 output "amplifier 124 [should be 126]", col. 8 line 1, and "antenna 102", which also serves as *transmitter* antenna) *for transmitting the received signal on said at least first and second bi-directional communication frequencies* (fig. 4 depicting "repeater 68" transmitting "CH2" signal to "T/R module 74"); *and*

an antenna (fig. 14 "antenna 102", col. 7 line 47) *operationally connected to said receiver and said transmitter* (fig. 14 depicting the coupling between "antenna 102" and "bandpass filters 104/106", *the receiver*, and "amplifier 124 [should be 126]", *the transmitter*), *wherein said transmitter and said receiver operate on different frequencies* (fig. 4 depicting "repeater 68" receiving "CH1" and transmitting "CH2", which is summarized by Lau as "When a given transmitter is transmitting, repeaters in range of that transmitter receive the signal, channel-shifting the signal, and retransmit it", col. 4 lines 19-21) *and use a time division duplex protocol* (refer to fig. 13 and see "fig. 13 shows a plan that provides substantially non-interfering channels via time-division multiplexing", col. 7 lines 29-30).

Regarding claim 27, *a wireless coverage extension device* (fig. 4 "repeater 68", for which a detailed embodiment can be seen also in fig. 15, noting that, as shown in fig. 4, "repeater 68" extends coverage of "basestation 60" to, for example, "T/R module 74") *capable of receiving and transmitting wireless signals from/to a first wireless station device and to/from a second wireless station device* (fig. 4 depicting "repeater 68" communicating with "basestation 60", *first wireless station*, and "T/R module 74",

second wireless station), *allowing the first and second wireless station device to communicate* ("When a given transmitter [e.g. "basestation 60"] is transmitting, repeaters [e.g. "repeater 68"] in range of that transmitter receive the signal, channel-shift the signal, and retransmit it ... The destination receiver [e.g. "T/R module 74"] will receive one or more of the originally transmitted signal and its repetitions, depending on the receiver's relative location in the network", col. 4 lines 19-27), *the wireless coverage extension device including an indicator for providing indication when received signal levels from at least one of the station devices are sufficient for communication between at least one of the first and second wireless station devices and the wireless coverage extension device* (see fig. 15 "power detector 168", "control circuit 166" and "control link 170", and further "control circuit 166 reports [via "control link 170"] to the base station the channel power received [detected by "power detector 168"] at each test point in the sequence, and any interference sources, allowing the base station to develop a repeating plan for the network that provides effective coverage", col. 9 lines 2-6).

- **With respect to dependent claims**

  Claims depending on claim 1:

Regarding claim 2, *wherein said signal detector* (fig. 15 "power detector 168") *operates at an intermediate frequency* ("the receiver downconverts a received signal to an intermediate frequency signal", col. 13 lines 33-34, noting that, as shown in fig. 15, the "power detector 168" detects signal from the receiver).

Regarding claim 3, *wherein said signal detector* (fig. 15 "power detector 168") *is for detecting the signal at a radio frequency* ("the receiver downconverts a received

signal to an intermediate frequency signal", col. 13 lines 33-34, which is also a *radio frequency.* Noting that, as shown in fig. 15, the "power detector 168" detects signal from the receiver).

Regarding claim 4, *wherein said receiver is for receiving signals on said at least two bi-directional frequencies simultaneously over a first antenna* (refer to figs. 4 and 5 in combination for "repeater 68" wherein fig. 4 shows the left side antenna receiving "CH1" signal and meanwhile fig. 5 shows the same left side antenna receiving "CH2" signal, and further see, in reference to fig. 115, "allows simultaneous transmit and receive", col. 8 line 33), *and*

said transmitter is for transmitting the converted signal on the other of said bi-directional frequencies over a second antenna (fig. 4 "repeater 68" transmitting via the right antenna "CH2" signal having a different frequency from the "CH1" signal received at the left side antenna of "repeater 68").

Regarding claim 6, *wherein said receiver and said transmitter share a single antenna that is connected to said receiver and said transmitter through an isolator* (fig. 15 depicting receive/transmit amplifiers 152/164 connected to "a dual switch 150", col. 8 line 35, since said dual switch "connects one of the filters to the input side or the circuit, ... and the other of the filters to the output side", col. 8 lines 35-38, it provided equivalent function as an *isolator*).

<u>Claims depending on claim 16:</u>

Regarding claim 17, *wherein at least one of said first or said second communication device* (fig. 4 "basestation 60") *is connected to a wired network and*

serves as a wireless gateway (it is well known in the art that a base station is connected to *wired networks* and *serves as a wireless gateway* the mobile stations/repeaters within the coverage area of the base station).

Claims depending on claim 18:

Regarding claim 19, *further including a circulator* (fig. 14 "circulator 128", col. 7 line 47) *for receiving a signal information packet on said receiver on said first bi-directional communication frequency and for transmitting the signal information packet using said transmitter on said second bi-directional communication frequency* (fig. 14 depicting "circulator 128" couples, on the one hand, to "bandpass filters 104/106", *the receiver*, and output "amplifier 124 [should be 126]", *the transmitter*, and fig. 4 depicting "CH1" frequency, *first bi-directional communication frequency*, and "CH2", *second bi-directional communication frequency*).

Regarding claim 20, *said receiver includes a signal detector* (fig. 14 "power detector 132" and "control circuit 130") *operatively coupled to the circulator* (fig. 14 depicting the coupling between "power detector 132" and "circulator 128"/"control circuit 130") *that determines if the signal is present on one of said at least first and second bi-directional communication frequencies* ("control circuit 130 operates switches 108 and 112 to test the relative strength of signals received on CH1 and CH2", col. 8 lines 6-8), *and a frequency converter operatively coupled to the receiver for converting the signal present on one of said at least first and second bi-directional communication frequencies to the other of said at least first and second bi-directional communication frequencies* ("upconverts the IF signal to the retransmission frequency, which is

amplified by amplifier 126 and transmitted on transmit antenna 128 [should be 120]", col. 7 line 67 - col. 8 line 2, which is further depicted in fig. 4 with respect to "repeater 68" receiving "CH1" signal and retransmitting "CH2").

Regarding claim 21, *wherein said detector includes a power indicator that detects the signal received at said receiver on one of said at least first and second bi-directional communication frequencies* (refer to fig. 14 and see "control circuit 130 operates switches 108 and 112 to test the relative strength of signals received on CH1 and CH2, and then selects a switch configuration for a repeating mode that corresponding with the strongest received signal", col. 8 lines 6-10, which requires providing *a power indicator* in order to be able to perform said "selection" of "CH1" or "CH2").

5. Claim 22 is rejected under 35 U.S.C. 102(e) as being anticipated by Jin et al (US 6,904,266, Jin hereinafter)

Jin provides an invention wherein "an improved enhancer is disclosed which uses a switch matrix" (Abstract line1 1-2) which "enhancer typically includes a donor antenna, a service antenna, and an electronic circuit that performs signal reception, amplification and re-transmission", col. 1 lines 13-15) comprising the following features:

Regarding claim 22, *a network* ("enhancer is a radio apparatus that is used in wireless communication systems", col. 1 lines 11-12) *operating on at least first and second bi-directional communication frequencies* ("using different frequencies at the donor and service antenna", col. 5 lines 53-54, noting that since, on the one hand, "an

enhancer receives a signal from the BTS through the donor antenna, enhances and re-transmits the signal to the intended terminal with the service antenna", col. 1 lines 18-29, and, on the other hand, "the enhancer receives a signal from the terminal through the service antenna, enhances and re-transmits it to the BTS using the donor antenna", col. 1 lines 22-24, the system or *network* as a whole is *operating on at least first and second communication frequencies*).

a base unit for transmitting and receiving data ("forward link (or down link) communications from a base transceiver station (BTS)", col. 1 lines 15-17) *said first and second bi-directional frequencies using a time division duplex protocol* ("the BTS and terminals employ time division duplex technology (TDD) for both the forward and reverse link communications", col. 1 lines 33-35) *on either of said at least first or second bi-directional communication frequencies* (the BTS will necessarily have to communicate using *either of said first or second bi-directional communication frequencies* since it communicates with the "enhancer" that is "using different frequencies at the donor and the service antenna" as cited above),

a client unit capable of transmitting and receiving data ("forward link (or down link) communications from a base transceiver station (BTS) to a terminal such as a mobile station", col. 1 lines 15-18, and "reverse link (or up link) communications from the terminal to the BTS", col. 1 lines 22-23) *said first and second bi-directional communication frequency using the time division duplex protocol* ("the BTS and terminals employ time division duplex technology (TDD) for both the forward and reverse link communications", col. 1 lines 33-35) *on either of said at least first or second*

bi-directional communication frequencies (the mobile station will necessarily have to communicate using *either of said at least first or second bi-directional communication frequencies* since it communicates with the "enhancer" that is "using different frequencies at the donor and the service antenna" as cited above), *and*

a repeater (fig. 1, "an enhancer according to one example of the present disclosure", col. 2 lines 59-60) *capable of communicating between said base unit* ("BTS") *and said client unit* ("mobile station", and, on the one hand, "an enhancer receives a signal from the BTS through the donor antenna, enhances and re-transmits the signal to the intended terminal with the service antenna", col. 1 lines 18-29, and, on the other hand, "the enhancer receives a signal from the terminal through the service antenna, enhances and re-transmits it to the BTS using the donor antenna", col. 1 lines 22-24) *using the time division duplex protocol* ("the enhancer needs to know the exact timing for the TDD switching", col. 1 lines 35-36) *on one of said at least first or second bi-directional communication frequencies different from that used by said client unit* (said "enhancer" "using different frequencies at the donor and service antenna", col. 5 lines 53-54).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over a first embodiment of Lau et al (US 6,690,657, Lau hereinafter) in view of a second embodiment of Lau.

Regarding claim 31, Lau discloses "a multichannel distributed wireless repeater network" (Abstract line 1) comprising the following features (first embodiment hereinafter): *in a wireless communication device* (fig. 15 wireless repeater 140"), *a method of re-transmitting a detected signal* ("when a given transmitter is transmitting, repeaters in rage of that transmitter receive the signal, channel-shift the signal, and retransmit it", col. 4 lines 19-21) *with amplification* (fig. 15 input amplifier 152 and output amplifier 164) *and/or frequency conversion* (fig. 15 frequency synthesizers 156/162 together with mixers 154/160) *comprising:*

performing a splitting function on the signal (fig. 15 "duplexer 144" which "contains bandpass filters 146 and 148, similar to filters 104 and 106 of fig. 13 [should be 14]", col. 8 lines 34-35, wherein "Bandpass filter 104 is designed to pass CH1 and reject CH2. Bandpass filter 106 is designed to pass CH2 and reject CH3", col. 7 lines 48-50, therefore, as a whole said duplexer equivalently provides *a splitting function on the signal*),

additionally coupling the splitting function to a detection function (fig. 15 depicting "duplexer 144" in coupling with "power detector 168"),

transmitting the signal using a transmitter function (fig. 15 "antenna 142", coupling with "duplexer 144" and output amplifier 164, provides *a transmitter function*),

the transmitter function being ... activated based on detection of the signal by the detection function (fig. 15 depicting "control circuit 166" controlling output amplifier 164 *based on detection of the signal by the* "power detector 168", and "control circuit 166 can reduce transmit power", col. 8 lines 59-60, which is obvious to one skilled in the art to include activate/deactivate amplification of the transmitter function).

Although in above cited first embodiment, Lau does not disclose *coupling* the splitting function *to a delay function, performing the delay function in parallel with* the detection function*; and* the transmitter function *being coupled to the delay function*, Lau discloses another embodiment (second embodiment hereinafter) wherein a *delay line* (fig. 17 "delay element 238", col. 10 line16) is used for *performing the delay function in parallel with the* detection function (fig. 17 "control circuit 246") and the transmitter function (fig. 17 "antenna 222" and output amplifier 250) *being coupled to the delay function* (fig. 17 depicting said coupling).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the delay function of the second embodiment of Lau into the first embodiment in order to provided a more robust repeater that is "suitable for use with time-division-multiplexing" (col. 10 lines 14-15).

Regarding claim 32, *wherein the delay function is sufficient to enable a reduction in truncation of the signal during transmission due to detection delays* (this is one of the foremost and well-known functionalities in the art for communication *delay function* or line. In fact, any communication delay function involving *detection delays* will all, by the mere nature of *delay, enable a reduction in truncation of signal*).

8. Claims 33 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over a first embodiment of Lau et al (US 6,690,657, Lau hereinafter) in view of a third embodiment of Lau.

Regarding claim 33, Lau discloses "a multichannel distributed wireless repeater network" (Abstract line 1) comprising the following features (first embodiment hereinafter): *a wireless coverage extension device* (fig. 4 "repeater 68", for which a detailed embodiment can be seen also in fig. 15, noting that, as shown in fig. 4, "repeater 68" extends coverage of "basestation 60" to, for example, "T/R module 74") *capable of receiving and transmitting wireless signals from/to a first wireless station device on a first bi-directional communication link and to/from a second wireless station device on a second bi-directional communication link* (fig. 4 depicting "repeater 68" communicating with "basestation 60", *first wireless station*, via "CH1", *first bi-directional link,* and "T/R module 74", *second wireless station*, via "CH2", *second bi-directional link*), *allowing the first and second wireless station device to communicate* ("When a given transmitter [e.g. "basestation 60"] is transmitting, repeaters [e.g. "repeater 68"] in range of that transmitter receive the signal, channel-shift the signal, and retransmit it ... The destination receiver [e.g. "T/R module 74"] will receive one or more of the originally transmitted signal and its repetitions, depending on the receiver's relative location in the network", col. 4 lines 19-27), *the first bi-directional communication link operating on a first frequency channel* (the "CH1" channel) *utilizing a first antenna* (fig. 4 "repeater 68" having an antenna to the left side therein communicating on "CH1" link), *and the second*

bi-directional communication link operating on a second frequency channel (the "CH2" channel) *utilizing a second antenna* (fig. 4 "repeater 68" having an antenna to the right side therein communication on "CH2" link)

Regarding claim 7, Lau discloses, in said first embodiment, claimed limitations in paragraph 4 above as applied to claim 1. Said first embodiment further teaches *wherein said receiver* (fig. 15 "duplexer 144") *includes first and second single frequency channel receivers* (fig. 15 "bandpass filters 146/148"), *where the first single frequency channel receiver* (i.e. "bandpass filter 144") *and a transmitter for a first frequency channel* (fig. 15 output "amplifier 164") *share a first antenna* (fig. 15 "antenna 142", noting that said antenna can be equivalently one of the two antennas of "repeater 68" of fig. 4, which is a functionally equivalent variation of "repeater 140" of fig. 15, such as the antenna on the left of "repeater 68" communicating "CH1" signals), *and the second single frequency channel receiver* (i.e. "bandpass filter 148") *and a transmitter* (fig. 15 output "amplifier 164") *for the second frequency channel share a second antenna* (fig. 15 "antenna 142", noting that said antenna can be equivalently the other one of the two antennas of "repeater 68" of fig. 4, which is a functionally equivalent variation of "repeater 140" of fig. 15, such as the antenna on the right of "repeater 68" communicating "CH2" signals)

Lau does not expressly disclose, in the above cited "first embodiment", regarding claim 33, that said first/second antennas of said "repeater 68" are *directional* antennas; and regarding claim 7, that said shared first/second antennas are *directionally isolated*. However, Lau discloses using *directional antennas* in a different embodiment (third

embodiment hereinafter) (refer to fig. 8 and see "For those units located in the interior of the building (e.g., T/R module 96 and repeater 94), an omni-directional or <u>elliptical pattern antenna</u> can be used", col. 6 lines 46-49, noting it is well known in the art that "elliptical pattern antenna" is *directional* depending on the axis orientation of the elliptical pattern).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the *directional antenna* of said third embodiment of Lau into said first embodiment of Lau in order to provide a more confined and secured network "that allows signal energy to be concentrated in the network and minimized outside of the network" (col. 6 lines 39-40).

9. Claim 23, 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over a first embodiment of Jin et al (US 6,904,266, Jin hereinafter) in view of a second embodiment of Jin.

Regarding claim 23, Jin's first embodiment (fig. 1) discloses claimed limitations in paragraph 5 above as applied to claim 22. Jin further discloses that *said repeater* ("enhancer") *includes:*

a receiver (fig. 1 "receiver sub-system 18", col. 3 line 29) *for receiving signals on at least said first and second bi-directional communication frequency* (see col. 3 Table 1 showing "receiver input port A" receiving signal for "forward link" from "donor antenna" and for "reverse link" from service antenna" wherein the "enhancer" is "using different frequencies at the donor and the service antenna" as cited above);

a frequency converter for converting a signal present on the first bi-directional frequency to a converted signal on the second bi-directional communication frequency ("receiver sub-system that amplifies and converts the incoming signal from the first antenna to a first predetermined frequency band, ... Also contained in the enhancer is a transmitter sub-system operable with the receiver subsystem that converts the signal from the receiver sub-system to a second predetermined frequency band", col. 2 lines 17-25"), *and*

a transmitter (fig. 1 "transmitter sub-system 20", col. 3 lines 29-30) *that transmits the converted signal on the second bi-directional communication frequency* ("on the transmitter sub-system side, ... the signal is first amplified ..., and up-converted into a radio frequency through another mixer 42 ... and eventually sent out to the predetermined terminal through the service antenna", col. 4 lines 20-28).

Regarding claim 24, *wherein a duration of the transmission of the detected signal on one of the at least first and second bi-directional communication frequencies is based on at least in part on a time duration counter started when the detected signal is detected* (refer to fig. 1 and see "the demodulator sub-system 21 plays a role in determining switching timing information between the reverse link and forward link communication sessions", col. 4 lines 47-49, which "determining switching timing" will have to be *based on at least in part on a time duration counter,* or timer).

Regarding claim 26, *wherein said receiver* (fig. 1 "receiver sub-system 18") *for each of the at least first and second bi-directional communication frequencies* ("using different frequencies at the donor and service antenna", col. 5 lines 53-54, noting that

the "donor/service antenna" are connected to the "receiver sub-system 18" as depicted in fig. 1) *is connected to at least two switches respectively* (fig. 1 "switch matrix 16", col. 3 line 29, wherein depicted is a switch at the top associated with "donor antenna 12" and a switch at the bottom associated with "service antenna 14", and both up/down link transmission will have to pass said two switches, one as one input switch and the other as output switch), *each of which is coupled to at least two directional antennas respectively* (fig. 1 "donor antenna 12" and "service antenna 14", and noting that said "donor antenna" serves the "BTS" and said "service antenna" serves the "mobile station" with the "enhancer" in between the "BTS" and the "mobile station", therefore, the two antennas will have to be *directional,* with "donor antenna" oriented towards the "BTS" and "service antenna" towards the "mobile station") *and to an additional switch* (fig. 1 port switch "B"), *which in turn is coupled to at least one transmitter* (fig. 1 depicting port switch "B" in direct coupling with "transmitter sub-system 20").

The above cited "first embodiment" does not expressly disclose, but a "second embodiment" having a modified switch matrix (fig. 2) does disclose:

Regarding claim 23, *a signal detector* (fig. 2 either "bandpass filter 52" or "bandpass filter 50") *operatively coupled to the receiver for determining if a signal is present on at least one of said at least first and second bi-directional communication frequencies* (fig. 2 depicting 52/51 "pass f1/f2, reject f2/f1", noting that in order to be able to perform said "pass/reject" frequencies f1/f2, the "bandpass filters" will have to be able to *determine if a signal is present on at least one of said at least first and second frequencies*)

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Jin's first embodiment by adding the signal detector, or bandpass filters, of Jin's second embodiment to the first in order to provide a cleaner repeater wherein the "concept of separating the frequency bands to isolate signals feeding into the donor and service antennas can be further improved", col. 5 lines 38-40).

10. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over a first embodiment of Jin et al (US 6,904,266, Jin hereinafter) in view of a second embodiment of Jin, as applied to claim 23 above, and further in view of Judd et al (US 2002/0177401, Judd hereinafter).

Jin's first embodiment in view of second embodiment discloses claimed limitations in paragraph 9 above. Jin further discloses:

Regarding claim 25, *wherein said receiver* (fig. 1 "receiver sub-system 18") *is connected to a first antenna* (fig. 1 "donor antenna 12" for downlink or "service antenna 14" for uplink) *and said transmitter* (fig. 1 "transmitter sub-system 20") *is connected to a second antenna* (fig. 1 "service antenna 14" for downlink or "donor antenna 12" for uplink).

Judd discloses "a repeater for use in connection with enhanced reception of wireless communications in an architectural structure utilizes a housing" (Abstract lines 1-3) using a "null antenna and a donor antenna" (Abstract lines 7-8).

Jin does not but Judd does disclose the following feature:

Regarding claim 25, *wherein the first and second antennas have largely orthogonal polarization* (refer to fig. 1 and see "the donor antenna 12 and null antenna 14 are orthogonally polarized, e.g., vertical polarization for the donor antenna 12 and horizontally polarization for the null antenna 14", [0026 lines 5-7).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the repeater system of Jin by adding the orthogonal antennas of Judd to Jin in order to provided a better quality in signal repeating that is able to "minimize the feedback between the antennas" (Judd, [0026 line 1) and further "to provide relatively high isolation between the antennas" (Judd, [0026] lines 3-4).

11. Claims 28-30 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lau et al (US 6,690,657, Lau hereinafter) in view of Judd et al (US 2002/0177401, Judd hereinafter)

Lau discloses "a multichannel distributed wireless repeater network" (Abstract line 1) comprising the following features:

Regarding claim 28, *a wireless coverage extension device* (fig. 4 "repeater 68", for which a detailed embodiment can be seen also in fig. 15, noting that, as shown in fig. 4, "repeater 68" extends coverage of "basestation 60" to, for example, "T/R module 74") *capable of receiving and transmitting wireless signals from/to a first wireless station device on a first bi-directional communication link and to/from a second wireless station device on a second bi-directional communication link* (fig. 4 depicting "repeater 68" communicating with "basestation 60", *first wireless station*, via "CH1", *first bi-directional*

link, and "T/R module 74", *second wireless station*, via "CH2", *second bi-directional link*), *allowing the first and second wireless station device to communicate* ("When a given transmitter [e.g. "basestation 60"] is transmitting, repeaters [e.g. "repeater 68"] in range of that transmitter receive the signal, channel-shift the signal, and retransmit it ... The destination receiver [e.g. "T/R module 74"] will receive one or more of the originally transmitted signal and its repetitions, depending on the receiver's relative location in the network", col. 4 lines 19-27), *the first bi-directional communication link operating on a first frequency channel* (the "CH1" channel) *utilizing a first antenna* (fig. 4 "repeater 68" having an antenna to the left side therein communicating on "CH1" link), *and the second bi-directional communication link operating on a second frequency channel* (the "CH2" channel) *utilizing a second antenna* (fig. 4 "repeater 68" having an antenna to the right side therein communication on "CH2" link).

Regarding claim 29, *where the first and second bi-directional communication links utilize 802.11 protocol or a derivative thereof* ("a distributed wireless local area network can be designed to overcome problems inherent in the prior art designs", col. 3 lines 61-62, which "prior art designs", as Lau states, includes "the IEEE 802.11 format", col. 2 line 25, therefore, Lau's system, as designed to "overcome problems inherent in the prior art designs" including IEEE 802.11, will must be able to *utilize 802.11 protocol*).

Regarding claim 30, *further comprising a demodulator for digital demodulating the detected signal during re-transmission* (it is well known in the art that IEEE 802.11 protocol repeaters necessarily have *demodulators for digital demodulating the detected signal during re-transmission*).

Regarding claim 5, Lau discloses claimed limitations in paragraph 4 above, especially those applied to claims 4 and 1.

Judd discloses "a repeater for use in connection with enhanced reception of wireless communications in an architectural structure utilizes a housing" (Abstract lines 1-3) using a "null antenna and a donor antenna" (Abstract lines 7-8).

Lau does not but Judd does disclose the following features:

Regarding claim 28, the first antenna *of a specific polarization* and the second antenna *with a polarization orthogonal to* the first antenna.

Regarding claim 5, *said first and second antennas have respective polarization that are largely orthogonal to one another.*

(refer to fig. 1 and see "the donor antenna 12 and null antenna 14 are orthogonally polarized, e.g., vertical polarization for the donor antenna 12 and horizontally polarization for the null antenna 14", [0026 lines 5-7).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the repeater system of Lau by adding the orthogonal antennas of Judd to Lau in order to provided a better quality in signal repeating that is able to "minimize the feedback between the antennas" (Judd, [0026 line 1) and further "to provide relatively high isolation between the antennas" (Judd, [0026] lines 3-4).

Allowable Subject Matter

12. Claims 8-15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 8 appears to contain certain allowable subject matters (underlined hereinbelow):

said frequency converter comprises <u>first and second frequency converters</u>, <u>each output of the splitter being coupled to said first and second frequency converters</u>, such that any signals on each of said at least two bi-directional frequencies will be present on the outputs of the first and second frequency converters respectively at intermediate frequencies, and wherein <u>each of first and second intermediate frequencies is coupled to respective first and second additional splitters</u>, <u>each of which includes a first output connected to a delay circuit and a second output connected to a detector circuit</u>, said delay circuit enabling re-transmission of one of the converted signal occurs using said delay circuit.

The believed to be closest arts of Lau, Jin and Judd applied throughout present Office Action, singularly or in combination, appear to be silent on the above underlined features and thus fail to anticipate or render the features obvious.

Claims 9 – 15 depend, directly or indirectly, from claim 8.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 5,883,884 discloses a wireless communication system employing multi-level repeaters with each level using different frequencies to communicate with higher/lower repeaters.

US 5,678,177 discloses RF repeaters for TDD cordless phone systems wherein a single amplifier is used for both up/down links with time counter to control transmission intervals in both directions.

US 6,384,765 provides repeater transmitters using receiving and transmitting antennas with orthogonal polarization.

US 5,268,897 teaches wired repeaters wherein two-way signal repeating is time duration controlled with time counters.

US 5,519,619 provides cellular communication systems with dynamic allocation of frequency spectrum.

US 5,862,207 discloses method and system for providing virtual telephone terminals using frequency conversion for wireless receivers and transmitters

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Lai whose telephone number is 571-272-9741. The examiner can normally be reached on M-F 7:30-5:00 EST, Off alternative Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kwang Yao can be reached on 571-272-3182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AL

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